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ABSTRACT

Increased student involvement with the computer at Delta State University, Mississippi, is considered. The university purchased a new computer, NCR Criterion, with six terminals and time-sharing BASIC. Two of these terminals are located in the Department of Physical Sciences, with the others located in the School of Business and in the University Instructional Resource Center. Additionally, a microcomputer was donated to the university. Involvement of students in computer-assisted instruction was approached in three ways. In cooperation with the Department of Mathematics, the number of computer programming courses available to science and mathematics students increased from one to two. The first course introduces the student to BASIC programming and the second allows students to make applications based on special interests. A second approach gave students in general chemistry and physical chemistry laboratories the opportunity to use instructor-prepared programs to aid with calculations on specific experiments. In addition, students in physical chemistry are introduced to BASIC programming so that they can write simple programs for their own use. The third major way to quickly involve students with computer-assisted instruction is through online student-computer dialog in which the computer asks the student questions, checks responses, and provides explanations where needed. These programs range from simple drill and practice to more complex simulations and tutorial sessions. A bibliography is appended. (SW)

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GETTING STARTED WITH INSTRUCTIONAL USES OF COMPUTERS

ABSTRACT

Experiences are described in which the Department of Physical Sciences progressed from very little use of computers to a point where computers are used as an instructional aid in many courses. The use of microcomputers and terminals to a large computer is discussed. Descriptions of several programs are presented.

GETTING STARTED WITH INSTRUCTIONAL USES OF COMPUTERS

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Within the past year opportunities for computer aided instruction have greatly improved for students in the physical sciences at Delta State University. Formerly the only computer experience available was a single course in FORTRAN programming. Offered once per year the enrollment was approximately ten, most of whom were chemistry majors. The first half of the course consisted of the fundamentals of programming, and the latter part involved application to some common problems in science.

Recent changes, however, have increased student involvement with the computer. The University purchased a new computer, NCR Criterion, with six terminals and time-sharing BASIC. Two of these terminals are located in the Department of Physical Sciences, with the others located nearby in the School of Business and in the University Instructional Resources Center. All are available for student use. At the same time an alumnus made a generous gift of a Radio Shack TRS-80 Microcomputer with the "Quick Printer", expansion interface, and mini-disk.

In preparation for an entry into computer aided instruction the author attended the fourth National Workshop on Computers in Chemical Education, sponsored by the Chemical Education Division of American Chemical Society in August 1979. Contact with those experienced in instructional computing proved extremely informative and useful. In addition, the recent "Computer Series" in Journal of Chemical Education has contained many suggesions for involving students in instructional computing. (1-8) All these experiences helped answer the question, "What is the fastest way we can get the most students involved in computer aided instruction?"

Three basic approaches were taken to provide the answer. In cooperation with the Department of Mathematics, the number of computer programming courses available to science and mathematics students increased from one to two. The first course introduces the student to BASIC programming using the terminals, TRS-80, and a second TRS-80 recently obtained by the Department of Mathematics. The second course has the first as a prerequisite and involves computer programming applications to coincide with a student's particular interest. In addition to classroom activities students could learn BASIC through the use of computerized instructional programs produced by Radio Shack (9). The popularity of these new learning opportunities is indicated by the fact

that each course has been offered once with a total enrollment of fifty. After completing one or both courses most students continue to apply the problem solving abilities of the computer to advanced science and mathematics courses.

Students in general chemistry and physical chemistry laboratories were given the opportunity to use instructor-prepared programs to aid with calculations on specific experiments. These programs helped the students keep sight of the purposes of the experiment instead of getting bogged down in tedious calculations. Sample programs of this type are the following:

BOMB--- calculation of heat of combustion from experiment in oxygen bomb calorimetry

CHCOMP--- a check of student results with experiments on the laws of definite composition and of multiple proportions

CHROM--- calculations for the analysis of a multicomponent mixture by gas chromatography

LNREG--- linear regression analysis to give slope, intercept, and correlation coefficient; modified to give slope and intercept when ln(y) is plotted vs. 1/x

MEAN--- calculation of mean and standard deviation of ungrouped data

PRCNT--- calculation of percent composition of a compound

QUAD--- solution to the quadratic equation

In executing these programs students are reminded to do one set of calculations themselves to make sure they know the principles involved. In addition to the above programs, students in physical chemistry are introduced to BASIC programming so that they may write simple programs for their own use.

Student use of these programs is high. During portions of the semester when general chemistry students are using these programs for on-line computing, use runs as high as 150 per week. This serves to increase enthusiasm for using the computer and learning more about computers.

The third major way to quickly involve students with computer aided instruction is through on-line student-computer dialog in which the computer asks the student questions, checks his response, and provides explanations where needed. These programs range from simple drill and practice to more complex simulations and tutorial sessions.

Examples of tutorial programs are the following:

EQUIL---simulation of systems in chemical equilibrium

IONS--- drill and practice with the formula, name, and charge of common ions

METRIC--- drill and practice with abbreviations and calculations involving metric units

MOLES--- Tutorial session on the mole concept and stoichiometry

QUAL--- simulation of group I qualitative analysis scheme

The design of a good CAI lesson involves the integration of drill, simulation, and dialog into an effective teaching instrument. Since the preparation of such a lesson takes quite a bit of time, it was decided to secure previously prepared CAI instructional material available from various sources. Many programs are described in the science education literature and are available at little or no cost from the author. A small sample appears in the bibliography.

The experiences of the past year have greatly improved the quality of education for students in chemistry courses through the use of educational technology. While making such a big, fast start requires much work, it is extremely rewarding. For others in the same situation, hopefully this article will increase your interest and enthusiasm in getting started.

LITERATURE CITED

(1) Collins, R. and Moore, J., "A Tool, Not a Gimmick: An Introduction to Computer Applications in Chemical Education", J. CHEM. EDUC., 56 140 (1979)

(2) Lower, S, et al, "Computer Assisted Instruction in Chemistry", J. CHEM. EDUC., 56, 219 (1979)

(3) Soltzberg, L., "Computer Graphics for Chemical Education", J. CHEM. EDUC., 56, 644 (1979)

(4) Gerhold, G., et al, "Bits, Bytes, Boards, Buses, and Beyond: A Chemist's Introduction to Microprocessors and Microcomputers", J. CHEM. EDUC., 56, 701 (1979)

(5) Moore, J., et al, "Computer Aided Instruction with Microcomputers, Systems and Applications", J. CHEM. EDUC., 56, 776 (1979)

(6) Moore, J., "Bits and Pieces", J. CHEM. EDUC., 57, 250 (1980)

(7) Johnson, K. J., "Simulation and Data Reduction Programs", J. CHEM. EDUC., 57, 406 (1980)

(8) Moore, J., et al, "Bits and Pieces, 2", J. CHEM. EDUC., 57, 619 (1980)

(9) TRS-80 Level II BASIC Instruction Course, Parts I and II, Tandy Corporation, Ft. Worth, TX 76102, 1979

BIBLIOGRAHY

CONDUIT (The University of Iowa), Box 388, Iowa City, IA 52244

Programs for Learning, Inc., Box 954, New Milford, CT 06776

Barrow, G. M., "Computer Studies for Physical Chemistry", Milne Press, Box 1246, Carmel Valley, CA 93924, 1979

Bork, A., "Computer Graphics in Learning", J. COL. SCI. TEACHING, 9, 141 (1980)

Breneman, G. L., "More CAI Programs", J. CHEM. EDUC., 56, 783 (1979)

Butler, W. M., and Griffin, H. C., "Simulations in the General Chemistry Laboratory with Microcomputers", J. CHEM. EDUC., 56, 543 (1979)

Castleberry, S. J., Culp, G. H., and Lagowski, J. J., "Impact of Computer Based Instructional Methods in General Chemistry", J. CHEM. EDUC., 50, 469 (1973)

Cody, R., "Computers in Education: A Review", J. COL. SCI. TEACHING, 3 (1) 22 (1973)

Gilbert, G., "Computers in Teaching: Now and Tomorrow", J. CHEM. EDUC., 54 13 (1977)

Jameson, C. J., "Computer-Enriched Modules for Introductory Chemistry", J. CHEM. EDUC., 54, 238 (1977)

Moore, C., Smith, S., and Avner, R. A., "Facilitation of Laboratory Performance through CAI", J. CHEM. EDUC., 57, 196 (1980)

Norris, A. C., Broadbent, S. T., and Davies, N. R., "Computer Package for Physical Chemistry", J. CHEM. EDUC., 50, 489 (1973)

Smith, S. G., and Chabay, R., "Computer Games in Chemistry", J. CHEM. EDUC., 54, 688 (1977)

Smith, S. G., Ghesquiere, J. R., and Avner, R. A., "Use of Computers in the Teaching of Chemistry: Evaluation of Lesson Effectiveness", J. CHEM. EDUC., 51, 243 (1974)

Zemke, W., "Selected Bibliography of Computer Programs in Chemical Education", J. CHEM. EDUC., 52, 592 (1975)